

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of	:	
	:	
Unlicensed Operation in the TV Broadcast Bands	:	ET Docket No. 04-186
	:	
	:	
Additional Spectrum for Unlicensed Devices below 900 MHz and in the 3 GHz Band	:	ET Docket No. 02-380
	:	

To: The Federal Communications Commission

SUMMARY

In its Notice of Proposed Rule Making (NPRM) the Commission suggests permitting operation of unlicensed devices within “unused” broadcast television channels. This portion of the electromagnetic spectrum is; however, currently used by broadcasters for operation of, *inter alia*, wireless microphones, wireless cueing devices (IFB’s) and wireless intercom systems. The efficient use of this panoply of radio frequency devices has become an absolute prerequisite for the production of high quality, on-site, live television broadcasts. These uses tend to be intensive (large numbers of devices operating throughout all, or virtually all, of the authorized spectrum) and are always temporary and itinerant. The feed from a wireless microphone is very often “direct to air” and therefore the audio product of that microphone must be of the highest possible quality. Since interference and loss of signal constitute baseline failures for the broadcaster - utilization of these devices requires that their operation be assured, error and interference free. Where these devices are deprived of that ability (to work interference free) the broadcaster is denied the opportunity of their use since even the risk of interference is unacceptable. Use of unlicensed devices as proposed would create substantial interference and cause broadcasters to avoid the utilization of wireless microphones. The loss of the availability of these devices would then severely curtail the scope and breadth of the broadcast as the production is then limited to hard-line, wired audio equipment.

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**Comments of
Total RF Marketing, Inc.**

Introduction

Total RF Marketing, Inc. (Total RF) is a supplier of wireless broadcast infrastructure and communications facilities to the broadcast industry, other commercial enterprises as well as local, state and federal governments. We have been in operation for over twelve (12) years and maintain our headquarters outside of Philadelphia, Pennsylvania. Our full-time engineering staff enjoys a combined 500+ years of wireless broadcast experience. While most of our team have come to us from the broadcast industry itself (from local stations and the networks) we also have a number of engineers whose backgrounds were forged in government, the military and industry. We have had the opportunity to provide our services and equipment to the broadcasters of such events as the Olympics (all of the Games since Barcelona in 1992), every major professional golf event (PGA and LPGA) and virtually every other major form of sporting event in the United States and internationally. We were instrumental in reestablishing communications facilities for the major networks subsequent to the terrorist attacks of September 11, 2001.

Total RF engineered and executed the first totally digital broadcast coverage of a sporting event in 1999 at the Americas Cup Races in Auckland, New Zealand. Today we are proud to be pioneering the development and utilization of extremely low latency

digital wireless cameras, wireless digital audio and a number of other technologic innovations aimed at enhancing spectral efficiency and the quality of the video and audio coverage we provide our clients.

Total RF holds numerous FCC licenses within the Broadcast Auxiliary Band, the Industrial Band as well as in the Local TV Band. We are intimately (and on a daily basis) involved in the art, science and diplomacy of frequency coordination as a consequence of our continuous involvement in the broadcast of large-scale event broadcast coverage. Our president, Steve Gansky, is the local Society Broadcast Engineers (SBE) frequency coordinator for the Philadelphia, Pennsylvania geographic area.

Our Perspective

As noted, Total RF provides wireless infrastructure to numerous clients, most of whom are broadcasters. We supply the engineering, equipment and personnel required to produce on-site, real time broadcasts of exemplary quality. We utilize wireless cameras, wireless microphones, digital microwave links as well as all of the ancillary equipment necessary to facilitate these types of broadcasts. Our goal, so to speak, is to be able to replicate on site (be it at a sporting or news event), the facilities available to a television director as if she were in a studio environment. We provide the engineering and technology necessary to allow the director the ability to put the audience into the action with “Point of View” cameras and remote miniature wireless microphones.

The majority of our business is in cooperation with national television networks in the facilitation and broadcast of television coverage of major events. As such, we find ourselves utilizing the extraordinarily finite number of channels allocated to TV broadcasters and the Broadcast Auxiliary Service.

Of course, as the “newsworthiness” and resulting public interest in a particular event increases so does the level of participation and coverage by a broadcaster (or several broadcasters). This inexorably leads to multiple users, of multiple pieces of equipment, vying for airwave access within the allocated frequency spectrum.

Inevitably and predictably, as the magnitude of the event increases so does the extent of the problem. In some cities in the United States (New York, Los Angeles) and at some events (2002 Salt Lake Olympics, the Super Bowls, the Democratic and

Republican National Conventions) the available spectrum is totally, completely and absolutely saturated.

What we now experience are more broadcasters, with more wireless cameras, microphones and associated RF radiating equipment attempting to shoehorn their way into limited, and now disappearing, spectrum.

The coordination of radio communication and wireless camera usage at events such as the Olympics, the Super Bowl and our national political conventions has so far worked – in a fashion. However, that process is fast approaching “critical mass”. Even now in many cases the coordination process taxes past any reasonable limit the available beneficence of the SBE Coordinators whose donation of time and effort to this task has been nothing short of miraculous. However, inevitably and invariably even with the Herculean efforts of the Coordinators, the individual broadcasters and their sub-contractors (all of whom are licensed and therefore subject to Commission control), conflicts and interference occur.

Interference during the broadcast of a live television show is much more than an inconvenience. Interference can and does deny the audience the event coverage they desire and reasonably expect. Its occurrence is not something that is amenable to correction after the fact. Where it occurs, the harm has been done, the coverage adversely impacted and the damages to that broadcast are irreparable. If a license to operate within a particular frequency is seen as a definable property ownership right, the legal prerogative to compensation for damage to that property right in this instance is inadequate to address any trespass.

Instances of interference during a broadcast and of substantial (and occasionally insurmountable) difficulties in frequency coordination¹ are increasing at a rate that is frightening for any broadcaster. These problems are a serious and constant impediment to producing quality broadcasts of newsworthy events.

¹ Aside from the omnipresent difficulties created by the sheer volume of users and requests for coordination – an interesting and relevant example in regards frequency coordination is the fact that currently a number of SBE frequency Coordinators will not coordinate our use of Channels 8 – 10 in several venues due to the particular venue’s use of 802.11 and 802.11b devices (ticketing, concessions and LAN uses) and the concern that *our operation* (licensed) *would interfere* with those (unlicensed) uses.

National (and international) sporting contests, current breaking news and political events are by their very nature itinerant. We find ourselves operating in various geographic locations throughout the country, in fact throughout the world, at any given time and for short periods of time. In fact, the Olympics would present generally the longest, in a temporal sense, activity that we generally are engaged in broadcasting. Even though our operation is itinerant and temporary, it is usually extremely intensive. In other words, when we are covering a newsworthy event, it is absolutely imperative to the broadcaster that our equipment and technology operate interference free.

The wireless services and technology provided by broadcast auxiliary services are the “first step” in virtually all on location electronic newsgathering operations. Wireless cameras and microphones allow the broadcast journalist to present the audience with live pictures and sound from the event. However this ability is determined, to a great extent, by the journalist’s freedom to move quickly and without impediment to the site of the event and the people involved. If the journalist is tethered (by the hard wires of the camera or microphone) his ability to present coverage is artificially limited.

Our product goes out to the public in “real time” – the moment it occurs. This is whether we are broadcasting a Big 10 College football game, the events and an interview at a political convention or the final hole of the U.S. Open. Our product is entirely time sensitive in the truest and most absolute sense. The news is only news when it is, in fact and in deed, occurring.

Our experience provides us with a perspective that is both national and global in scope. Our expertise is with the actual production of quality, state of the art on-site television event coverage. Our familiarity is real life and real time, requiring that we address issues of spectrum management and use on a daily basis. The success of our business and our clients’ broadcasts is inextricably tied to the ability to utilize wireless technology and equipment such as wireless microphones effectively, efficiently and interference free.

Discussion

Wireless Microphones and associated equipment are essential to the production of live on-site Television Broadcasts

The Commission stated in its Notice of Proposed Rule Making that it “believes that permitting unlicensed devices to use vacant TV channels would further the goals and efforts of Congress and the Commission to encourage and promote efficient and effective use of the radio spectrum.”² Certainly the mandate given the Commission by Congress and as described in the Communications Act of 1934 requires that the Commission seek out new uses for radio and promote efficient use of available radio frequency spectrum.³ The new uses that have been proposed are exciting and innovative. However, excitement over the possibilities of these new devices should not blind the Commission to the difficulties inherent in their unfettered use in areas where that use may well adversely (in fact catastrophically) impact the use of other devices. This is particularly true where, as here, any level of interference will itself cause the broadcaster to refrain from reliance on the technology.

From a reading of the NPRM we believe that the Commission has failed to recognize and appreciate the fact that there are few – if any – completely “unused” or “vacant” TV channels. While it is accurate to note that these channels may not be assigned to a single static entity and may not be used on a daily or continuous basis by broadcasters, this does not mean that they are perpetually “open”. In fact those same broadcasters, as well as the companies that support them, extensively use these “vacant” channels for the operation of wireless microphones and associated devices.

Wireless microphones and their associated devices have become an essential component of current high quality; live, on-site event broadcast coverage. Their use permits a depth and breadth of coverage unavailable with solely “wired” audio devices. These devices permit the journalist or sports commentator freedom from a tether. The commentator may roam about the field, the convention floor, and the scene of a newsworthy event in search of stories of public interest. Unlike the video portion of the

² Notice of Proposed Rule Making in ET Docket 04-186, released May 25, 2004, paragraph 8, page 5.

³ 47 U.S.C. §§303(g) and 309(j)(3)(D)

coverage where a telescopic lens may be easily used by a remote camera to capture an event, the audio pick-up must be immediately proximate to the speaker or activity covered.

Wireless Microphones must be protected from interference caused by unlicensed devices or they will be rendered unusable in live broadcasts.

Interference and the consequential destruction of the audio and/or video portion of a television broadcast constitute a fundamental failure within that broadcast. Wireless devices are usable within a television broadcast only to the extent that they are able to provide their product without interference or degradation to the content of the broadcast. Interference in the context of a television broadcast is unacceptable in that even minor instances of frequency incursion (and the resulting interference) by other users substantially and adversely impacts upon the quality of a broadcast. In fact, television consumer has grown to expect that television broadcasts, be they live, on site, live in the studio or taped, be essentially of the same exemplary quality.

We have experienced “first hand” that radiation from certain unlicensed devices has the propensity to adversely impact our ability to provide interference free, broadcast quality audio to our client. For example, during the Democratic and Republican National Conventions this past summer, we were constantly faced with interference caused as a result of the operation of wireless LAN connections when the wireless router or computer was nearby our wireless microphone receivers. Eventually, after determining the source of the problem we were forced to “ban” routers and laptops running wireless LAN from rooms where our receivers were located. Since these devices were not then operating on frequencies proximate to our wireless microphones, expelling them from the room worked. Where they are allowed to operate on these same frequencies the interference potential will be enormous and not so easily addressed.

In fact, as developed through testing conducted by Shure, Inc., the potential for harmful interference from these types of unlicensed devices is extraordinary. Shure’s investigation clearly demonstrates that these types of devices have the capacity to disrupt the use of wireless microphones even where operated *one thousand feet* distant from the

microphone.⁴ This is an incredible finding. Effectively this means that without strict interference protection in place and enforced, wireless microphones will be rendered useless in virtually every context in which they are presently used by broadcasters.

If degradation of the quality of the broadcast is unacceptable, and the risk of interference is present, directors will be compelled to curtail the depth and breadth of their coverage by limiting their feed to solely “wired” components. The broadcaster is simply unable to accept the possibility that its production will be marred by interference. The announcers and journalists will once again be tethered to a single, static location. The ability to provide the audience with sideline and floor interviews of the participants will be lost. Other than the suggested dedication of channels for use by wireless microphones exclusively, the protections described in the NPRM are insufficient.

*In the event that the Commission permits unlicensed devices in the TV bands,
Interference Protection must be afforded Wireless Microphones*

As has been stated in this Comment, auxiliary broadcasters such as Total RF are itinerant. We move from place to place and from time to time to provide coverage of newsworthy events. The infrastructure that is provided by auxiliary services such as Total RF is absolutely essential to the provision of real time on-site coverage of these events. While an ever greater majority of the consumers of television receive their signal through cable or satellite (as opposed to over the air broadcast) the actual collection of the sound and images on-site at sporting events, live entertainment programs and news coverage is increasingly and importantly obtained and collected by wireless technology.

Broadcasters, in order to provide “state of art” live, on location television must be assured of a static, defined and sufficient cache of “clear” spectrum throughout the United States that is guaranteed to be available for their broadcast infrastructure. Without that guarantee, again on a national basis, the ability to provide instantaneous real time coverage is severely curtailed if not destroyed.

⁴ See generally: Shure, Inc., *ex parte* presentation to the staff of the Commission’s Office of Engineering and Technology on August 4, 2004, ET docket 04-186.

The Commission is endowed with certain specific powers⁵ to facilitate the performance of its primary responsibility – the development and protection of the use of the airwaves in and for the public interest. In the event that the Commission acts upon its stated intention to allow the operation of unlicensed devices within the TV bands, then interference protection is fundamentally required. A number of suggestions have been proposed that may reduce the chance of disruptive interference should the Commission move forward on its proposal to allow these devices in the TV bands. We request that the Commission not permit these devices in the TV bands at all, but should the decision be otherwise would suggest the following measures, at a minimum.

Exempt TV Channels

The NPRM suggested that one possible manner of obtaining the protection necessary would be to exempt certain channels within each market where unlicensed devices are not authorized to operate. We believe that this approach *may* provide the necessary protection – during *most* operations. An exempt bank of *at least* six (6) channels would be necessary in every TV market. With such an exemption, operation of wireless microphones and associated devices will be provided a “safe harbor” where the possibility of harmful interference from unlicensed devices will be reduced.

However, this approach to balancing competing interests will still severely restrict the available spectrum for these devices and, accordingly, the scope of the broadcast. Further in many broadcasts in which we have been involved, a dedicated bank of six channels would have incredibly limited the coverage of the event.⁶ Of course, these “exempt” channels would, by necessity, change from market to market. How would the “unlicensed device” be similarly restricted? We believe that both a sensing and “beacon” approach be used in addition to the exempt channels and these approaches are discussed further below in this Comment.

In addition, the Commission should note that in many instances six dedicated channels will be completely insufficient to address the demand for mobile coverage of an

⁵ 48 U.S.C. § 303

⁶ For example, in our broadcast coverage of the New York City Marathon we utilize, at a minimum, ten (10) channels for wireless microphones and ancillary equipment.

event.⁷ In such a case, the use of the remaining broadcast spectrum must be allowed the current, licensed and invested users on a primary and interference free basis. The unlicensed devices must be removed or precluded from using channels that broadcasters are utilizing at that particular moment.

Beacon Signal

In conjunction with the dedication of specific channels for operation of wireless microphones and associated devices, since these channels will differ, market to market, the unlicensed devices must be required to search for available “open” channels and be required to refrain from operation in then currently utilized spectrum. The beacon would broadcast which channels are being utilized and are therefore unavailable for the unlicensed device. Responsibility for the installation and operation of the beacon (pursuant to Part 74 Rules) would necessarily fall on the broadcasters. While this certainly will increase the cost of the production – the corresponding benefit (avoidance of interference during the broadcast) will make it well worth the effort.

Unlicensed devices must be required to “sense” open spectrum

In many situations, for example a “breaking story” requiring mobile coverage, the installation of a beacon may not be feasible. Or, where the event covers a great distance or substantial geographic area, for example a Marathon or Cycling Tour event, setting beacons throughout the course area will be impossible or infeasible. Therefore, unlicensed devices must be required to search for and sense available “open” spectrum prior to operation, as well as continuously during operation. Where it senses operation it must either transmit in another, unused frequency or terminate transmission so as not to cause interference.

⁷ At many large-scale events literally hundreds of channels and microphones are in use. For example, for the production of live coverage of the Super Bowl or a national political convention, upwards of 200 wireless audio channels may be required to operate simultaneously.

CONCLUSION

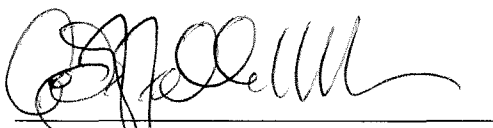
Total RF Marketing, Inc., as a Broadcast Auxiliary provider, has built much of its business around the use of wireless microphones and their associated devices. This technology is absolutely essential to the modern, efficient production of television broadcasts of large scale, newsworthy events. The public's desire for these broadcasts (sports, political conventions and news programs provide some of televisions most highly watched programming) is self-evident.

These devices are an integral part of television broadcasts. However, where their product may be degraded by interference they will become immediately unusable in a broadcast context. The virtual certainty of harmful interference that will be occasioned by the use of these devices in the TV broadcast bands must be considered by the Commission and should result in the Commissions decision to refrain from permitting their operation in these bands.

In the event that the Commission proceeds with its Proposed Rule, given the substantial harm that may befall users of wireless microphones and similar devices in the broadcast field, the Commission must advance substantive protections for these uses. These steps would include, at a minimum, the exemption of at least six (6) TV channels in each market as well as a requirement that the unlicensed devices search for and sense open channels and refrain from operation in channels in which a beacon is operating.

Respectfully Submitted,

TOTAL RF MARKETING, INC.

A handwritten signature in black ink, appearing to read 'Fred Fellmeth', written over a horizontal line.

Fred Fellmeth
General Counsel